Recitation 16
October 30, 2008

1. Problem 6.2, page 326 in the text.

   Dave fails quizzes with probability $\frac{1}{4}$, independent of other quizzes.

   (a) What is the probability that Dave fails exactly two of the next six quizzes?

   (b) What is the expected number of quizzes that Dave will pass before he has failed three times?

   (c) What is the probability that the second and third time Dave fails a quiz will occur when he takes his eighth and ninth quizzes, respectively?

   (d) What is the probability that Dave fails two quizzes in a row before he passes two quizzes in a row?

   Each time that Dave passes a quiz, his mother flips a fair coin out of happiness, and if it comes up heads, she sends him a candy bar in the post.

   (e) What is the expected number of quizzes that Dave must take in order to collect six candy bars?

   (f) What is the expected number of quizzes he must pass in order to collect six candy bars?

2. Problem 6.4, page 327 in the text.

   Consider a Bernoulli process with probability of success in each trial equal to p.

   (a) Relate the number of failures before the rth success (sometimes called a **negative binomial** random variable) to a Pascal random variable and derive its PMF.

   (b) Find the expected value and variance of the number of failures before the rth success.

   (c) Obtain an expression for the probability that the ith failure occurs before the rth success.

3. **Random incidence in the Bernoulli process.** Problem 6.5, pages 327-328 in the text.

   Your cousin has been playing the same video game from time immemorial. Assume that he wins each game with probability p, independent of the outcomes of the other games. At midnight, you enter his room and witness his losing the current game. What is the PMF of the number of lost games between his most recent win and his first future win?